AGE DETERMINATION AND LUMPY JAW EVALUATION OF DALL'S SHEEP HARVESTED BY NON-RESIDENTS IN THE MACKENZIE MOUNTAINS, 1987

Northwest Territories Renewable Resources

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AGE DETERMINATION AND LUMPY JAW EVALUATION OF DALL'S SHEEP HARVESTED BY NON-RESIDENTS IN THE MACKENZIE MOUNTAINS, 1987

LES KUTNY[1]

AND

GORDON STENHOUSE[2]

DEPARTMENT OF RENEWABLE RESOURCES

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[1] Present address: Science Institute of the NWT, Inuvik, NWT.
[2] Present address: Ducks Unlimited Canada, Box 2641, Yellowknife, NWT.

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ABSTRACT

Ages of Dall's sheep harvested by non-resident hunters in the Mackenzie Mountains, NWT, in 1987 were determined from both horn annuli and cementum annuli. Lower jaws from harvested sheep were submitted from each outfitter in Zone E/1. The severity of lumpy jaw infection was visually rated before extracting and sectioning the first incisor. Of the sheep harvested, 43% had comparable ages, and 29% of the comparable samples had the same age for both horn and cementum annuli. The samples with an age difference showed that the cementum annuli age was higher than the horn annuli age. A comparison of lumpy jaw severity showed no statistically significant ($p<.05$) difference among zones. If a decline in 8+ year old rams becomes evident, some populations are likely to be in serious jeopardy of extirpation.

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INTRODUCTION

The age distribution of Dall's sheep (Ovis dalli) harvested by non-resident hunters has been monitored since 1972. Reported here is the age distribution and the incidence of lumpy jaw infection of rams harvested by non-resident hunters in 1987. General hunting license holders and resident hunters are not required by legislation to submit jaws from sheep taken, and it is believed that they account for a small percentage of the annual Dall's sheep harvest. Comparisons are made between ages obtained from horn annuli and from cementum annuli. Data were received from all outfitting areas in wildlife management unit E/1. Annual reports of these data have been completed since 1984 (Jingfors 1984, Kutny and Jingfors 1986, Kutny and Stenhouse in prep.). To date, there are no population estimates for Dall's sheep in the Mackenzie Mountains. The results of a 1988 survey in zone E/1-1 should be forthcoming.[1]

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[1] Editorial note: Abundance and distribution of Dall's sheep in the Liard Range, Kotaneelee Range, Prairie Creek area, Nahanni Range, and Tlogotsho Plateau of the southern Mackenzie Mountains, based on surveys from 1984 to 1988, are summarized in Case, R. 1989. Distribution and abundance of Dall's sheep in the southern Mackenzie Mountains, NWT. NWT. Dept. of Ren. Res. File Rep. No. 81. 39 pp.

METHODS

The lower jaws from Dall's sheep taken by non-resident hunters in the eight outfitting areas of the Mackenzie Mountains (Zone E/1) were submitted by the outfitters (Table 1) to Renewable Resources area offices in Norman Wells, Fort Liard, and Fort Simpson, NWT. The age of some ram horns that were exported were also estimated by counting the horn annuli.

All jaws were sent to Inuvik for comparative age determination and to examine the severity of lumpy jaw infection. Jaws were rated visually for lumpy jaw, and the severity was ranked from 0 to 4 based on the presence and extent of infection:

0 = not infected: bone natural and compact;

1 = slightly infected: swelling of mandible in this region as revealed by increased width, some perforation of bone, but teeth normal, no necrosis or osteolysis.

2 = infection of medium severity: pronounced swelling of mandibular region, increased perforation of bone, some necrosis (erosion of bone) at base of teeth, uneven wear of teeth, angle of teeth affected.

3 = severe infection: severe necrosis and osteolysis, teeth deformed, growing at displaced angles, broken or missing entirely. Severe swelling of mandible. Large holes in mandible, "honey combing" of jaw. Bone at base of teeth eroded away, resulting in appearance of elongated cheek teeth.

Table 1. 1987 Class A Outfitters in the Mackenzie Mountains, NWT (Zone E/1).

Zone	Operator	Address
E/1-1	Ray Woodward	Arctic Red River Outfitters Ltd., Box 1457, Lloydminster, Alberta. S9V 1K4
E/1-2	Gary Koopman	Gana River Outfitters Ltd., 911 Pitcairn Ct., Kelowna, B.C. V1Y 4E5
E/1-3	Stan Stevens	Mackenzie Mountain Outfitters Ltd., Box 124, Norman Wells, NWT. X0E 0V0
E/1-4	Stan Simpson	Ram Head Outfitters Ltd., Box 89, Warburg, Alberta. T0C 2T0
E/1-5	Duane Nelson	N.W.T. Outfitters Ltd., Box 1154, Glenwood, Alberta. T0K 2R0
E/1-6	Tim & Hugh MacAuley	Redstone Mountain Trophy Hunts, Box 608, Banff, Alberta. T0L 0C0
E/1-7	Bob Woodward	South Nahanni Outfitters Ltd., Box 586, Cardston, Alberta. T0K 0K0
E/1-8	Greg Williams	Nahanni Butte Outfitters Ltd., Box 879, Nanton, Alberta. T0L 1R0

The first incisors (I1) were removed using the procedures outlined by Turner (1977). All samples were tagged and numbered consecutively for ease of handling and the recording of data. Original tag numbers, issued when a sheep hunting license was purchased, were used on all slides to allow comparison with ages determined from horn annuli.

Decalcification of incisors took 18 hours in a 4% nitric acid solution. The incisors were then rinsed under running tap water for 24 hours. A .65 mm section of the root of each tooth was cut off and frozen before being sectioned into 7-10 micron longitudinal sections with a microtome/cryostat (TissueTek II, Miles Ltd.). The tooth sections were floated in quartered petri dishes of basic water and mounted on albumenated slides. The slides were dried at room temperature then stained with a toluidine blue solution before being read under a compound microscope (40-100x). When the section was read, one year was added to the age obtained because the permanent primary incisor does not erupt until the animal is about 13 months old (Hemming 1969). The degree of readability of the sectioned teeth was recorded on a scale of A to D (A = easy to read, B = readable, C = difficult to read, D = very difficult to read).

RESULTS AND DISCUSSION

In 1987 the hunter success rate was 93.6% compared with 68.3% in 1986, 69.2% in 1985 and 62% in 1984. These calculations are based on the number of non-resident sheep tags sold (Table 2). It is recognized that although some hunters may purchase a tag for Dall's sheep, they may be primarily hunting for caribou, moose, or grizzly bears, and may only take a sheep if they encounter this species or if they find a large enough trophy during their hunting trip.

The jaw return rate of 86.3% for all eight areas (E/1-1 to E/1-8) was higher than for the 1986 return (72.3%), but was slightly lower than the 1985 (88%) and 1984 (89%) returns for the six areas (E/1-1 to E/1-6). The percentage of missing jaws from the 1987 known harvest by outfitting area ranged from 0% (E/1-2) to 29% (E/1-6) with an average of 14% over all eight outfitting areas.

There was comparable information on ages determined from horn annuli and those determined from tooth cementum for 43% (80) of the total sample. This was lower than either 1986 or 1985 data, at 61% and 72%, respectively. This was a result of a lack of data recorded on horn annuli.

Table 2. Summary of non-resident hunter kill of Dall's sheep in the Mackenzie Mountains, 1987.

Zone	# of tags sold	# of sheep taken	# of jaws ret'd	Horn Annuli N	Horn Annuli Mean Age	Horn Annuli S.D.	Cementum Annuli N	Cementum Annuli Mean Age	Cementum Annuli S.D.	Sheep 8+ yrs.
E1-1	27	27	26	15	9.1	1.8	26	9.0	1.5	77%
E1-2	23	16	16	9	8.9	2.1	16	9.1	1.4	69%
E1-3	25	24	21	14	9.1	1.1	21	9.4	1.2	88%
E1-4	29	29	22	20	9.0	2.1	22	9.8	2.3	69%
E1-5	13	11	10	11	8.8	0.9	10	8.7	0.5	91%
E1-6	22	21	15	10	8.3	2.4	15	9.6	1.5	76%
E1-7	14	14	11	10	8.5	1.3	11	8.6	1.1	64%
E1-8	18	18	17	5	8.8	1.1	17	9.0	1.3	83%
TOTAL	171	160	138	94	8.9	1.7	138	9.2	1.5	76%

Age structure of harvested sheep

The ages determined from cementum annuli were the same in 29% (23) of the sample as the ages determined from the horn annuli. A difference of one year was found in 45% (36) of horn versus cementum annuli. Eleven percent (9) had a difference of two years, while 15% (12) had a difference of three or more years.

Of those samples with a one year age difference, the ages from horn annuli were higher than those from cementum in 42% (15), while in 58% (21) the ages from cementum were higher. The samples with a difference of two years showed 22% (2) with an age determined from horn annuli higher than that from cementum, and 78% (7) with a higher age from cementum. The samples with a three year or greater difference showed a similar pattern. There were 33% (4) with higher age from horn annuli and 67% (8) with higher age from cementum. Of the entire comparable sample, 37% (21) had higher ages determined from horn annuli, while 63% (36) had higher ages from cementum (Table 2).

The mean ages recorded were 9.2 years and 8.9 years for cementum and horn annuli, respectively. This difference was statistically significant ($t = 2.26$, $p<.05$). The ages determined from cementum annuli ranged from 7 to 16 years while ages from 6 to 14 years were determined from horn annuli. The mean age of the sheep harvested in 1984, 1985, 1986 and 1987 was 8.6 years

(n=108)[1], 8.4 years (n=108)[1], 8.7 years (n=166), and 9.1 years (n=106), respectively. These differences are not statistically significant ($F = .04$, $p<.05$). Although these data should be encouraging to managers and outfitters, it must be stressed that the resident sheep harvest remains untracked for size (we assume that they are legal (3/4 curl) rams), and most significantly, age. It is not known whether or not this untracked segment of the population would differ from the current data base of harvested sheep.

Lumpy Jaw

Of the jaws submitted, 22% (30) only had an incisor bar and the incidence of lumpy jaw cannot be determined from these samples. Another 9% of the samples consisted of half of the jaw; of these, the evidence of lumpy jaw was lower than for the complete jaws. This finding could be an artifact of the way samples were selected by outfitters for submission. A substantial proportion (72%) of the complete jaws were classified as normal while only 7% were considered to be severely infected (Table 3). As in previous years (Kutny and Jingfors 1986, Kutny and Stenhouse in prep.), variation was found in the incidence of

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[1] does not include zone E/1-7 or E/1-8.

lumpy jaw among the outfitting areas. However, these differences among zones were not statistically significant ($p<.05$). It is possible that this observed variation is more a product of sample size limitations than geographical area, but this variation cannot be accounted for at present.

Table 3. Incidence and severity of lumpy jaw infection in Dall's sheep harvested by non-residents in the Mackenzie Mountains, NWT, 1987.

Zone	Jaws submitted	Normal (0)	Light (1)	Moderate (2)	Severe (4)
E/1-1	10	8(80%)	1(10%)	1(10%)	0
E/1-2	13	9(69%)	1(8%)	0	3(23%)
E/1-3	17(1a)	12(67%)	1(5%)	2(11%)	3(17%)
E/1-4	22	15(68%)	4(18%)	3(14%)	0
E/1-5	9	4(45%)	3(33%)	2(22%)	0
E/1-6	15	10(67%)	3(20%)	0	2(13%)
E/1-7	0(11a)	11(100%)	0	0	0
E/1-8	9	7(78%)	2(22%)	0	0
TOTAL	95(12a)	77(72%)	15(14%)	8(7%)	8(7%)

(a) only half of the jaw was submitted.

CONCLUSION

If we assume that overharvested sheep populations would show a steady decline in the percentage of 8+ year old sheep in the harvest sample, the sheep population in the Mackenzie Mountains does not appear to be declining. It is encouraging that, with the number of sheep taken being similar to previous years, the mean age is higher, although the difference is not statistically significant. As encouraging as the data are, we believe that by the time a decline in the percentage of 8+ year old rams is evident in the harvest, some populations will be in serious jeopardy of extirpation.

Continued monitoring of the harvest is considered to be vital to detect any changes in the population age structure. Obtaining information on General Hunting License (GHL) and resident harvests would also be beneficial to include with existing data. Continuing to obtain a population estimate for different areas of the Mackenzie Mountains each year would supply information on the entire Dall's sheep population instead of just the harvested rams.

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